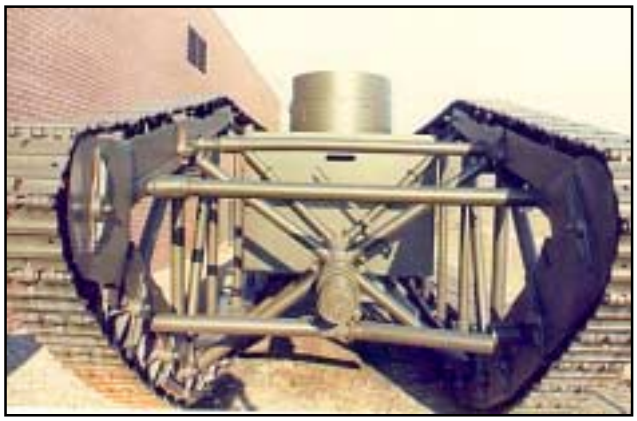
Edwin M. Wheelock and the "Skeleton Tank":

Did the original idea for the tank Hatch in the mind of a Yankee inventor?

by Major Dennis Gaare

Although a number of individuals, from Leonardo Da Vinci to H. G. Wells, imagined machines that are similar to modern tanks, we generally credit the invention of the tank to the British. According to the accepted wisdom, British Lieutenant Colonel Ernest D. Swinton, serving with the British Expeditionary Forces in October 1914, reached the conclusion that an armored machine capable of forcing its way through barbed-wire obstacles, climbing over trenches, and destroying or crushing machine guns was needed to break the tactical stalemate of the Western Front.



Wheelock's Skeleton Tank was constructed of standard threaded pipe sections. Only the fighting compartment was armored. This design may have preceded the British concept made famous during World War I.

Swinton was reportedly inspired by a letter from a friend who had seen the American Holt agricultural tractor and described it as "a Yankee tractor which could climb like the devil." Swinton's proposal, forwarded to the War Office on 20 October, called for the construction of heavily armored caterpillar tractors armed with artillery pieces and machine guns.[1] Swinton simply put the readily available pieces together and came up with the tank, an invention whose time had come.

But there is another claim for the tank's origins, based on tantalizing evidence that an American tractor manufacturer from a small town in Minnesota came up with the concept before Swinton, and that he provided the British with the detailed inspiration, even the blueprints, that became the first tank.

Edwin M. Wheelock, the vice-president and general manager of the Pioneer Tractor Company, of Winona, Minnesota, claimed to have developed and documented the tank concept nearly two months before Swinton's tank proposal. He further claimed that, in hopes of generating sales of his proposed armored vehicle, he provided plans to the British that they then covertly used as the basis for the first tanks. Wheelock's assertions are given credibility by his subsequent development of the unique "Skeleton Tank" for the U.S. Army. The story is an obscure one, and newspapers friendly to Wheelock's position may be the only American record of the tale.

In August 1914, Wheelock was in Calgary, Canada, trying to close a business transaction for his tractor company. The deal hinged upon whether or not the British declared war on Germany. When they did, his business negotiations ended. On his return trip to Winona, Wheelock was searching for something to replace the tractor sales that his firm had hoped to make in Europe and the idea of an armored war machine began to dawn. By the time he arrived back in Winona, two days later, he had the tank concept quite well planned.[2]

After trying and failing to get a customer for his war machines in Canada, Wheelock engaged Frances J. Lowe to travel to England for the purpose of selling tractors and interesting the British Army in his armored caterpillar vehicle design.

In 1925, Lowe recounted his experience: "In April, 1915, I went to Europe to sell some caterpillar tractors and took with me some blueprints of a proposed 60,000-pound armored tractor made by Mr. Wheelock." Lowe went to see Colonel, Sir Henry Capel-Lofft Holden, director of mechanical transport, at the War Office in London. When Colonel Holden learned that the armored tractor plan called for a machine weighing more than 25 tons he said, according to Lowe, "Come, Come! This is another Yankee invention to win the war. It will break down any bridge in Belgium and besides, you Yanks don't know that we drive to the left of the road instead of the right, so it will block traffic as well." "Finally," Mr. Lowe says, "Colonel Holden introduced me to a Major [then Lieutenant] Wilson, who took the plans and said he would let me know if we were to get any orders, but I never heard from him until after the battle of the Somme, when it was reported that funny looking 'cheese boxes' were going over the top and chasing the Germans."[3]

Prior to Lowe's visit, the British had been struggling to make Swinton's concept work. They had not been able to achieve real cross-county mobility or trench-crossing capability. Then, shortly after Lowe's visit, the project came around. According to one account, the design work was continued under the direction of the "Landships Committee," and, a little later on, caterpillar tractors for experimental purposes were

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obtained from America. In the meantime, the question of design was discussed with Sir William Tritton, of Foster's Ltd. (a company that built the first British tanks), and at the same time Lieutenant (now Major) W. G. Wilson, an experienced engineer, was brought in as consultant, and a design was evolved which eventually embodied the form finally adopted and adhered to for tanks. Thus it was through the "Landships Committee," at a moment when the military authorities were inclined to regard the difficulties connected with the problem as likely to prove insuperable, that the landship, or tank, as it was later called, was first brought into being.[4] Was it Wheelock's plans that enabled Wilson and Tritton to succeed?

The accuracy of Mr. Lowe's colorful account of proceedings is not known, but if essentially true, Mr. Lowe may have provided Major Wilson the plans and blueprints that solved the mobility problem and became the first tank. Considering that tractors of the time were massive iron machines, yet capable of cross-country mobility, it is certainly conceivable that a tractor designer formulated the designs that made the concept of a tank work. However, Major Wilson and Tritton were subsequently the individuals largely credited for the specifics of the design of the original tanks. Of course, Wheelock did not know of Swinton's proposal or the closely guarded development of tanks until news reports of the Battle of the Somme appeared in America.

No doubt motivated by his business interests and the potential for receiving award money that had been put up by the British government for the invention of the tank, Wheelock again sent his sales representative, Lowe, back to London. He wanted to determine why his company was not receiving orders for the new vehicles when it appeared that the British tanks were practically identical to the machine that he had designed and blueprinted. The trip, however, proved fruitless. Nothing could be learned, not even the disposition of his particular original designs. In his efforts, Lowe came across Tritton. "At first, Tritton thought I was a newspaper man and talked freely, but when I asked him if he knew Holden and Wilson he asked point blank what I really was after? I told him that I wanted to get the £10,000 prize money for America and he said that under the terms of the government only British inventors could get it."[5] Wheelock never received credit for his work or any financial compensation from the British. Later, when the British government offered the prize to the inventor of the tank, Wheelock made a formal claim for it, but the British prize court awarded the money, after two different hearings, to the Englishman Swinton. It appears probable that at no time did the British authorities intend the award for anyone but a British subject.[6]

The dealings with the British were a disappointment; however, the United States would eventually get into the war and the U.S. Army would then need tanks.

With the United States' late entry into the war, the War Department focused its production efforts on a frustrating process of trying to produce existing tank designs in cooperation with both England and France. One way seen to get tanks built in a timely manner was to produce Liberty engines for the proposed Mk VIII tank that was to be fabricated in England and assembled in France. In another effort, the Ford Motor Company and the U.S. Army coordinated to build, in America, the Renault FT-17 design. Both efforts hit various snags and failed to get a single tank to the front before the armistice.

While the U.S. tried to apply the foreign designs, a small number of unproven American designs were in the works, among them a design from Wheelock and the Pioneer Tractor Company.

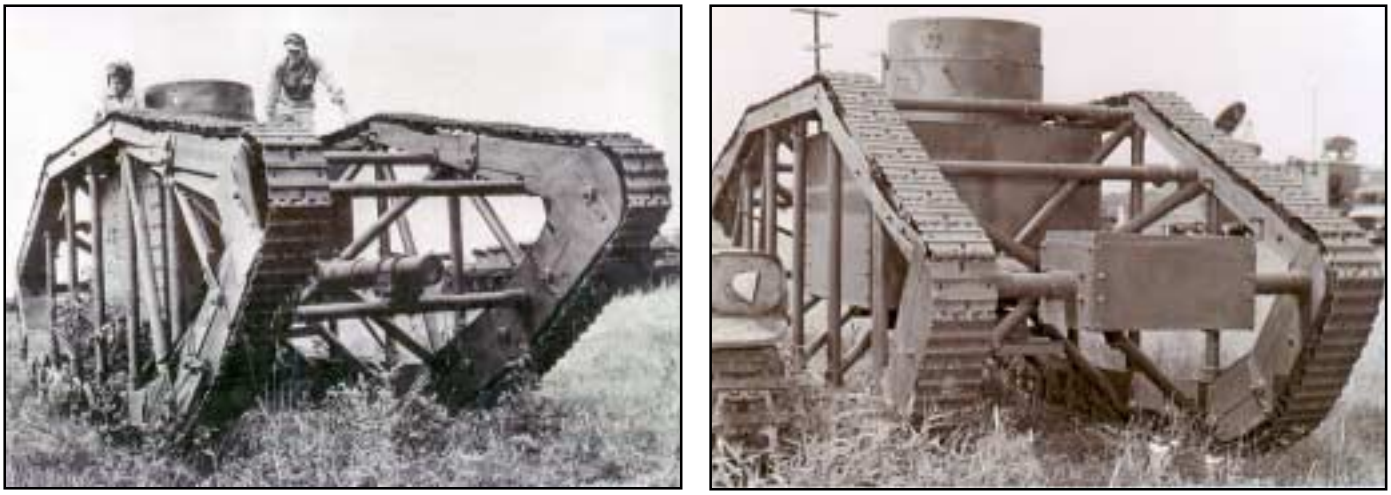
What the Army wanted from Wheelock was the combined capabilities of the two most successful tanks of the time. They wanted a tank that was nimble, efficient and a small target like the FT-17. At the same time, because trenches were the prominent feature of the WWI battlefield and they could easily swallow up the little FT-17, they also wanted to retain the trench- and obstacle-crossing capabilities of the mammoth rhomboid tanks built by the British. The resulting hybrid was the Skeleton Tank.

Wheelock built his tank with the object of keeping weight down as much as possible without sacrificing cross-country and trench-crossing performance. A lozenge-shape was achieved in a skeleton form using ordinary iron pipes with standard plumbing connections. Suspended between the track frames was a box-like fighting and engine compartment of half-inch armor plate. This compartment carried two Beaver 4-cylinder engines, each of 50 horsepower, with forced water-cooling and a drive shaft to the front sprockets. A turret surmounted the fighting compartment and the prototype could carry a .30-caliber machine gun, though the vehicle's armament was never finalized. The prototype had a two-man crew and was 25 feet long, 8 feet 5 inches wide, and 9 feet 6 inches high. It weighed only 9 tons and had excellent performance with very low ground pressure.[7]

Years later, George K. West, an officer of the Pioneer Tractor Company at the time, described some of the original thinking that went into the design of the tank. "Wheelock built the frame of pipe so the whole outfit could be unthreaded for shipment abroad and then screwed together again. His idea in leaving the frame unprotected by armor was so enemy shells and bullets would have less of a target, only the pipes, to shoot at. His theory was that if one of the pipes was directly hit and shattered, its loss would not seriously affect operation of the tank and that if not too many of the pipes were hit and demolished in battle, they could easily be replaced afterward."[8]

There were a number of other advantages offered by this unconventional design. By using standard plumbing fixtures, steel pipe, and wood, the materials and skills needed to build and maintain the tank were already easily available. The extensive use of common off-the-shelf components would save time and money in the factory and on the battlefield.

As a fighting vehicle, the design also had interesting features. When viewed from various angles, up to half of the



Wheelock's unusual design kept weight down (9 tons) while retaining cross-country and trench-crossing capabilities. In addition, there was little for the enemy to shoot at. The pipe construction would allow the tank to be dismantled and shipped, then reassembled on arrival in theater. The two-man crew rode in the half-inch-thick armored box suspended from the frame.

vehicle's background showed through the structure. No paint scheme in the world could match that for an adaptive camouflage method. What could be seen of the vehicle was a mix of pipes, flat plates and shadows, which made the vehicle very hard to discern, compared to the large flat surfaces of the Mk IV/Mk V, tanks of similar size and shape. Additionally, since nothing but track and frame was within three feet of the ground, and given that it was so light on its tracks, the vehicle probably had a fording capability that was unmatched at the time. In fact, Wheelock tested the vehicle in the Mississippi River.

The prototype was a concept demonstration and was not intended for combat. The weapon configuration was never finalized and a fully functioning weapons station with anything more than a light machine gun would have required more developmental work. The armored compartments around critical areas were not complete, the top of the turret and engine compartment were open, as was the bottom of the differential. The hardwood and sheet metal used to house the running gear may not have held up well on the battlefield. However, they were only needed to prevent sand and dirt from throwing the track and were not critical to the tank's operation in all conditions. If damaged, they were easily replaced. (Using wood on armored vehicles is not that unusual. The FT-17 had wooden idler wheels at the time.) Bringing the prototype to the battlefield would have taken time and added weight, but it would not have invalidated the design principles.

Wheelock and the Army continually coordinated on the development and, by October 1918, the tank was about ready to be handed over to the Army for testing and evaluation. A number of Army agencies were involved in various facets of the development, so bureaucratic procedures and contradicting opinions hampered the program. One of the Army officials visiting Winona, possibly humoring the local reporter, said that the vehicle was, "one of the most effective and most modern devices of its kind."[9] On the other hand, Major T. F. Flynn, who was sent to Winona to accept the vehicle for the Army, and was apparently unfamiliar with the program wrote, "Machine inspected and found to be of very crude construction and not at all up to Ordnance standards."[10] By the time the Army decided who was in charge, that the vehicle was what they had in fact asked for, and the last few minor mechanical problems were worked out, the armistice had been signed. Despite being lauded for its mobility, when the war ended, the Army did not feel it needed the program and any production plans were canceled.

The high point for the vehicle and its inventor probably came when the vehicle was revealed to the people of Winona. Although the vehicle had been seen driving through the shallow water on the sand bars in the Mississippi while it was being developed, there was a wartime restriction on the release of defense information and the locals probably did not know exactly what the strange contraption was. The local newspaper commented, "Winona yesterday, in the Victory day parade, got its first glimpse of a war implement that has been manufactured here and which the American government planned to use upon the battlefields of Europe. The Hun caved before there was need of this device, but the work here had been speeded and the first of the product was in readiness for delivery when the armistice terms were signed."[11] This appearance inspired another short-lived name for the tank, the "Spider Tank." It is unclear when the name Skeleton Tank became the common identification.

Wheelock's claims against the British have never been validated and little seems to exist in records or books. Considering that he was a man who demonstrated the ability to design an innovative fighting vehicle and that his story is corroborated by reputable colleagues, it is hard to accept that his story is a lie or even an exaggeration. If true, he certainly made some business mistakes. He held no patent or any other type of ownership documentation and Lowe handed over the only set of plans without getting any type of receipt. The Pioneer Tractor Company did not do well in dealing with the U.S. Army on documentation either. The Skeleton Tank lacked plans, manuals, and procedures. After failing to get a response with written correspondence, the Army sent Captain W. E. Blaine back to Winona to retrieve the needed documentation. What he found was only one set of blueprints and a series of pencil drawings.[12] In light of their lack of emphasis on documentation, perhaps what Lowe presented to the British was of a format that it, although a viable idea and a solution to their specific problem, was not considered a serious business proposal.

Could the British have simply stolen Wheelock's ideas, down to his plans? If a foreigner had handed them an unsolicited proposal for a war machine, it

The photo at left, taken by the author in November 2001, shows the tank awaiting restoration at Aberdeen Proving Ground.

would have been only logical for them to act in their own interest. Great Britain and allies were at war with Germany and its allies. At the time, it was possible that United States could have remained neutral, in which case a contract with a private citizen for war material might not have held up. It was also conceivable that America might have even came in on the side of the Germans, in which case an American could not have been trusted with British military information or business. From a practical standpoint, it would have been very difficult to try to do business with Wheelock even if they wanted to. Lines of communication to the U.S. were long, slow, and would become risky. And, with those conditions, it would have been impossible to keep the deal a secret. Even to acknowledge that the idea had merit would have only encouraged Wheelock to seek out other customers, and at the time even the U.S. was a potential enemy. What looked like stealing to Wheelock and his company was, to the British, the prudent exploitation of documents, willingly handed over by a private citizen of a foreign country.

The other possibility is that Wilson kept the plans to himself, taking credit for the ideas as he used them. This is unlikely. Accounts of Wheelock's attempt to garner the prize money seem to indicate that no one was challenging the sincerity of his claim; they seemed to simply be collectively ignoring any American involvement. If only Wilson knew of the plans, the reaction to Wheelock's assertions would have been much different. The proceedings of the two prize courts might shed light on the issue, but that information could not be found.

The Pioneer Tractor Company was paid $15,000 for its work on the Skeleton Tank. It did not produce any other fighting vehicles and went out of business in 1928.[13] Wheelock remained in Winona with the company until 1923, when he moved to Cuba. In 1953, Wheelock, about eighty years old at the time, was living in Minneapolis. In an April 1953 letter, Wheelock, no doubt still bitter, wrote to a correspondent in Virginia, "SO MARK YOU. The conception (of the armored war tank) occurred before the British were at war with Germany, and the plans and drawings were on paper before Nov. 1, 1914."[14] What became of Wheelock after 1953 is not known. The truth behind his story may never be known and any evidence that would prove his claim is likely lost to history.

What remains is the Skeleton Tank. It was transported to Aberdeen Proving Ground in 1918 where it was tested at least into 1919, but it was never put into service. Sources vary on whether it was ever armed, but most likely it was tested with a .30-caliber machine gun. In 1945, the vehicle was turned over to the Ordnance Museum where it was displayed for years as one of the oldest and most unique vehicles in the museum's collection. In 1988, it was moved from the display area to a secure area for storage. Unfortunately, because of its size, it had to be stored outdoors and it has suffered some deterioration from the effects of weather and vegetation. In spite of that, the eighty-year-old pipes, and most of the other components, are still in good condition. The good news is that money has been allocated by the Ordnance Museum to restore the vehicle. This one-of-a-kind piece of history should be back in display condition within the next few years and on display when a facility capable of protecting the Museum's collection is available.

Notes

[1]F. Mitchell, *Tank Warfare: The Story of Tanks in the Great War* (London: Thomas Nelson and Sons, Ltd., 1933), p. 4 (from D. Wilson, *Treat'em Rough!*, Novato, Calif.: Presidio Press, 1990).

[2]B. Manderfeld, "Was former Winonan battle tank inventor*?" Winona Sunday News*, 22 August 1971: p. 8a.

[3]"American Claims Share in Prize of $150,000 for 'Tank' Invention*," New York Times*, 28 November 1925. (Clipping is incomplete; the *New York Times* is the probable source but not confirmed.)

[4]J.F.C. Fuller, *Tanks in the Great War*, 1914-1918, (London: John Murray, 1920), p. 25.

[5]"American Claims Share in Prize of $150,000 for 'Tank' Invention."

[6]Manderfeld.

[7]P. Chamberlain and C. Ellis, *A Pictorial History of the Tanks of the World 1915-45*, (Harrisburg, Pa.: Stackpole Books, 1972).

[8]"Man Who Designed War Tractor, Former Winonan, Never Received Reward For Tank's Invention," *The Winona Republican*, 31 June 1942.

[9]"Winona Sees Spider Tank, Product of Local Concern On Streets Here On Monday," *The Winona Independent*, 12 November 1918, p. 6.

[10]T.F. Flynn, Memorandum, 15 November 1918.

[11]"Winona Sees Spider Tank..."

[12]U.S. Army Ordnance Department, Memorandum, 14 April 1919.

[13]Manderfeld.

[14]Ibid.

(Source information provided by Eric Sayer Peterson, Leo D. Johns, and the U.S. Army Ordnance Museum.)

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